

**EPA Superfund
Record of Decision:**

**NEW HANOVER CNTY AIRPORT BURN PIT
EPA ID: NCD981021157
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WILMINGTON, NC
09/29/1992**

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

New Hanover County Airport Burn Pit
Wilmington, New Hanover County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the New Hanover County Airport Burn Pit Superfund Site in Wilmington, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record file for this Site.

The State of North Carolina conditionally concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Presently, no unacceptable current or future risks were identified associated with the New Hanover Site; however, concentrations of contaminants in the groundwater are above federal maximum concentration levels and state groundwater quality standards.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy addresses the elevated concentrations of groundwater contaminants and restores the aquifer to drinking water quality. No further action is required for Site soils.

The selected remedy, Alternative GW3, will permanently remove contaminants in the groundwater through groundwater extraction and on-site, aboveground treatment. The following activities are involved in this alternative:

- A one year period for the collection of additional data on groundwater quality.
- Following a treatability study, contaminated groundwater will be extracted from within and at the periphery of the plume via extraction wells and piped to an on-site, above-ground treatment process.
- Pretreatment may be required to remove total suspended solids and iron. The pretreatment step would generate a by-product sludge.
- Treatment process consists of an air stripper to reduce the levels of contamination to the pretreatment requirements of the publicly owned treatment works. Additional treatment will be achieved by the publicly owned treatment works.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining in the groundwater on-site above the chemical -specific applicable requirements, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

THE DECISION SUMMARY FOR THE RECORD OF DECISION

NEW HANOVER AIRPORT BURN PIT SITE

WILMINGTON, NEW HANOVER COUNTY NORTH CAROLINA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA

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List of Acronyms

ARAR	-	Applicable or Relevant and Appropriate Federal, State or Local Requirements
AWQC	-	Ambient Water Quality Criteria
CAA	-	Clean Air Act
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act of 1980(Superfund)
cm/sec	-	centimeters per second
CRP	-	Community Relations Plan
CSF	-	Cancer Slope Factor
CWA	-	Clean Water Act
ESD	-	Explanation of Significant Difference
EPA	-	Environmental Protection Agency
FS	-	Feasibility Study
GAC	-	Granular Activated Carbon
gpm	-	gallons per minute
HI	-	Hazard Index
HQ	-	Hazard Quotient
HRS	-	Hazardous Ranking System
LDRs	-	Land Disposal Restrictions
MCLs	-	Maximum Contaminant Levels
MCLGs	-	Maximum Contaminant Level Goals
mg/kg	-	milligrams per kilogram
mph	-	miles per hour
MW	-	Monitoring Well
NCAC	-	North Carolina Administrative Code
NCDHR	-	North Carolina Department of Human Resources
NCDNRCD	-	North Carolina Department of Natural Resources and Community Development
NCDEHNR	-	North Carolina Department of Environment, Health, and Natural Resources
NCGS	-	North Carolina General Statute
NCP	-	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	-	National Oceanic and Atmospheric Administration
NPDES	-	National Pollution Discharge Elimination System
NPL	-	National Priority List
O&M	-	Operation and Maintenance
PAHs	-	Polycyclic Aromatic Hydrocarbons
PCBs	-	Polychlorinated Biphenyls
POTW	-	Publicly Owned Treatment Works
ppm	-	parts per million
PRPs	-	Potentially Responsible Parties
PW	-	Present Worth
RA	-	Remedial Action
RCRA	-	Resource Conservation and Recovery Act
RfD	-	Reference Dose
RD	-	Remedial Design
RI	-	Remedial Investigation
RME	-	Reasonable Maximum Exposure
ROD	-	Record of Decision
SARA	-	Superfund Amendments and Reauthorization Act of 1986
SDWA	-	Safe Drinking Water Act
SFFFRs	-	Submerged Fixed Film Reactors
SVOCs	-	Semi-volatile Organic Compounds
TAL	-	Target Analyte List
TBC	-	To Be Considered
TCL	-	Target Compound List
TCLP	-	Toxicity Characteristic Leaching Procedure
TMV	-	Toxicity, Mobility, or Volume
ug/kg	-	micrograms per kilogram
ug/l	-	micrograms per liter
UV/OX	-	Ultraviolet/Oxidation
VOCs	-	Volatile Organic Compounds

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

FOR THE NEW HANOVER COUNTY AIRPORT BURN PIT SUPERFUND SITE WILMINGTON, NEW HANOVER COUNTY, NORTH CAROLINA

1.0 INTRODUCTION

The New Hanover County Airport Burn Pit Superfund Site (New Hanover Site or the Site) was proposed for the National Priority List (NPL) in June 1988 and was finalized on the list in March 1989 with a Hazardous Ranking System (HRS) score of 39.39. As of March 1992, the Site was ranked/grouped 518 out of 1218 NPL sites across the country.

The New Hanover Site Remedial Investigation (RI) and Feasibility Study (FS) have been completed. The RI, completed in January 1992, characterized the nature and probable extent of the uncontrolled hazardous waste at the Site. The Baseline Risk Assessment, completed in August 1992, defined the risk posed by the hazardous waste described in the RI. The Proposed Plan Fact Sheet, based on the May 18, 1992 draft FS document, provided the public a summary of the detailed analysis of the No Action remedial alternative for soil and the five (5) remedial alternatives for groundwater remediation.

This Record of Decision (ROD) has been prepared to summarize the remedial selection process and to present the selected remedial alternative.

2.0 SITE LOCATION AND DESCRIPTION

The New Hanover Site is located on Gardner Road approximately 500 feet west of the New Hanover County Airport in New Hanover County. The airport is approximately 1 1/2 miles north of Wilmington, North Carolina at latitude 34 16'29" north and longitude 77 54'55" west. Figure 1 shows the location of the Site within the State of North Carolina and the County of New Hanover. The 1,500 square foot burn pit was located near the center of a 4-acre plot as shown in Figure 2.

Land use in the vicinity of the Site is commercial, industrial, and residential. There are rental car maintenance facilities, a closed sawmill/lumberyard, and a trucking company to the east of the Site. The land immediately northeast, north, west and south of the Site is forested with mixed southern hardwood forest, typical of the coastal plain area. This wooded area extends for approximately 300 to 500 feet west and north and 800 feet south of the Site. The closest residential area is approximately 1,100 feet to the west of the Site. This residential area is separated from the Site by a road, railroad tracks, and a wooded area (refer to Figure 3).

3.0 SITE HISTORY

The New Hanover County Airport, originally called the Bluthenthal Airport, was built in the 1920's as a civil air facility owned by New Hanover County. In 1942, the Department of Defense requisitioned the airport for the United States (U.S.) Army Air Corps. Between 1947 and 1948, the Army deeded the airport back to the County. During the Korean War, the airport operations were assumed by the U.S. Marine Corps for military purposes and during the Vietnam conflict, the U.S. Air Force took control of the airport. Between the Korean War and the Vietnam conflict and following the Vietnam conflict, the airport operations were under the control of the County. The facility was renamed the New Hanover County Airport in 1970.

The Site was originally developed as a military hospital during World War II. The construction date of the original burn pit is unknown, but a second pit was constructed in 1968 and used until 1979 by the Air Force and Cape Fear Technical Institute for firefighter training purposes. The Wilmington Fire Department and a number of fire departments in New Hanover County used the facility for firefighter training purposes from 1968 to 1974. The burn pit was of earthen construction, 30 feet by 50 feet in dimension, surrounded by a 3 foot berm, located near the center of a 4-acre open field. The bottom of the pit did not extend below the land surface.

Jet fuel, gasoline, petroleum storage tank bottoms, fuel oil, kerosene, sorbent materials from

oil spill cleanups, and on at least one occasion, confiscated marijuana were burned in the pit. It is estimated that between 100 to 500 gallons of ignitable fuel were used during each firefighting training exercise. Water was the primary fire extinguishing agent; however, carbon dioxide and dry chemicals were also used.

Inspections conducted after the pit was abandoned showed most of the standing liquid in the pit was water. During its active years, water from the pit was allowed to flow onto the land surface. The bottom of the pit and the soils immediately surrounding the pit were black with characteristics similar to tar.

In addition to the burn pit, there were other areas of the Site contaminated as a result of the firefighting training activities. These areas can be located in Figure 2 and include:

an auto burn area,

a railroad tank car burn area,

an aircraft mock-up made of 55 gallon drums burn area,

the fuel supply tank,

the pipeline from the supply tank to each burn area, and

two stained soil areas north of the burn pit.

Several concrete block buildings (apparently constructed as part of the military hospital) are located onsite. Only the building referred to as the "smoke house" was used in the firefighting training exercises. These concrete block buildings do not contain any hazardous wastes.

The fuel distribution system consisted of an above ground storage tank and an underground pipeline system. The fuel pipeline system was buried approximately 1 foot below land surface. The pipeline extended from the storage tank northwest to a junction box. The valve controlling flow to the burn pit was located approximately half-way along this segment of the pipeline. At the junction box, valves controlled flow to the other three firefighter training areas. These features can be located in Figure 2.

In addition, a small amount of medical waste (discarded syringes which were apparently burned) was noted in the area of the aircraft mock-up during the confirmation sampling (December, 1990). A manhole accessing the former infirmary's septic tank was also located. The potentially responsible parties (PRPs) agreed to dispose of the medical waste as part of the removal plan; the contents of the septic tank were investigated by U.S. Environmental Protection Agency (EPA) as part of the RI.

In 1985, sampling by the New Hanover County Department of Engineering showed heavy metals and volatile organic compounds (VOCs) in the pit sludge. In May 1986, the North Carolina Department of Health Services sampled the bottom sludge layer of the pit and soil adjacent to and outside of the pit. Detected in these samples were heavy metals, polycyclic aromatic hydrocarbons (PAHs), and VOCs. The County applied for a Non-Discharge Permit to close out the burn pit by land application of the pit contents. The permit was granted because the statutory response time was exceeded by the State. However, the State suggested that New Hanover County not land farm the pit contents because of concerns over possible lead and chlorinated solvent contamination. The County complied with this request.

Originally, efforts were made to dispose of the pit material by incineration or recycling. These efforts were unsuccessful because of the high solids and water content resulting in a low British Thermal Unit value for the material. It was also found that it was not feasible to pump the sludge.

A survey for hazard ranking purposes was conducted at the Site on January 9, 1987. The Site was proposed on the NPL in June 1988 and was finalized on the NPL in March 1989. The Site ranked

518 out of 1218. The total HRS score was 39.39. The individual scores for groundwater, surface water, and air were 67.69, 7.83, and 0.0, respectively.

The Agency for Toxic Substances and Disease Registry (ATSDR) conducted a health assessment of the New Hanover Site in March 1989. The Health Assessment concluded that the Site is of potential public concern because of risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects.

EPA entered an Administrative Order on Consent (AOC) with the PRPs on June 21, 1990 outlining the removal actions to be performed at the Site. This AOC gave the PRPs approval to conduct the removal action. The removal began in November 1990 and was completed in December 1990. The PRP sponsored removal involved removing waste materials, contaminated water, and contaminated surface and subsurface soils. A total of 12,500 gallons of water was removed from the pit and 6,000 gallons of water was removed from on-site tanks. Contaminated surface and subsurface soils were removed from the firefighter training areas. In addition, structures associated with firefighter training activities were dismantled and removed, including the fuel supply tank and its associated underground piping system, the railroad tank car, the automobile bodies and the aircraft mock-up made of 55-gallon drums. A total of 3,220 tons of contaminated soil and debris were removed. Excavated areas were backfilled to grade with 2,680 cubic yards of clean soil. During the removal, 5 drums of blue paint sludge from around the perimeter of the Site were also removed. These drums were overpacked and properly disposed of in accordance with Resource Conservation and Recovery Act (RCRA) regulations.

The removal of wastes and contaminated soils significantly altered the scope of the RI/FS. Characterization of the Site consisted of confirming that the source had been removed, confirming that the presence of any residual soil contamination would not adversely impact either human health or the environment, de?? Site specific geology and hydrogeology and the extent of groundwater contamination, and conducting an endangered species survey.

4.0 ENFORCEMENT ACTIVITIES

The "Responsible Party Search" document was completed by EPA on July 20, 1988. Information request letters pursuant to Section 104 of Comprehensive Environmental response, Compensation, and Liability Act (CERCLA) and Section 3007 of RCRA were sent to the identified PRPs.

The following entities were identified as PRPs for the New Hanover Site:

- New Hanover County (current owner/prior operator),
- City of Wilmington (generator/prior operator - trained firefighters at the Site),
- Cape Fear Technical Institute Foundation, Inc. (prior generator/operator - trained fire fighters at the Site),
- United States Customs Service (prior generator/operator reportedly burned confiscated drugs at the Site), and
- United States Air Force (prior generator/operator trained firefighters at the Site).

CSX Transportation, Inc. was initially identified as a PRP, however, they were excluded from the final list of PRPs because the only material CSX reportedly contributed to the Site was diesel fuel. Diesel fuel is not a hazardous substance under CERCLA by virtue of the petroleum exclusion found in Section 101(14) of CERCLA, 42 U.S.C. S 9601(14).

Providing the opportunity to conduct the RI/FS, special notice letters were sent to the PRPs on September 20, 1989. The PRPs submitted a good faith offer prior to the end of the 60-day moratorium, however, the Agency found the good faith offer to be deficient. Therefore, the moratorium was not extended an additional 30-days to allow for the completion of the RI/FS AOC negotiations. Consequently, the Agency initiated Fund monies to conduct the RI/FS.

The PRPs, however, did sign an AOC to conduct a removal action at the Site in May 1990. The AOC required the PRPs to conduct a cleanup of the surface and subsurface soils. This work was done between November and December 1990 and was overseen by the Agency.

Similarly, by issuance of a special notice letter, the PRPs will be offered the opportunity to conduct the remedial design/remedial action (RD/RA) as specified in this ROD.

5.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Community relations activities for this Site were initiated in May 1990, in conjunction with the development of the RI/FS work plan. Community officials, civic leaders, and residents in the immediate vicinity of the Site were interviewed to determine the current level of Site awareness, gauge potential concerns, and provide a basis for developing and implementing a comprehensive community relations plan for the Site.

Information Repositories/Administrative Records for this Site were established at the New Hanover County Public Library and in EPA, Region IV Regional Information Center in Atlanta, Georgia. A Community Relations Plan (CRP) identifying a proactive public outreach strategy was developed at the direction of EPA, Region IV staff and submitted to the information repositories prior to initiating RI field work. The following describes the community relations activities conducted by the Agency for this Site.

Two fact sheets and the Proposed Plan Fact Sheet were distributed to the public during the New Hanover RI/FS. The first fact sheet, disseminated in March 1991, provided the community a description of the Site, a brief history of the Site, a summary of previous investigations at the Site, a brief overview of the Superfund program, a list of RI and FS objectives, a time frame for activities, a list of contacts for more information and community relations activities, and a glossary of terms and acronyms commonly used in the Superfund program.

This fact sheet preceded the first public meeting. This public meeting, the "Kick-Off Meeting", was held on April 4, 1991. The following topics were emphasized at this meeting: the Superfund process, community relations activities, field work as proposed in the RI/FS Work Plan, and a question and answer session.

A second Fact Sheet was distributed in December 1991. This fact sheet summarized the findings and conclusions of the RI, restated the objectives of the FS, and provided a revised time frame for future activities at the Site.

The public was informed through the Proposed Plan Fact Sheet and an ad published on June 3, 1992 in the Wilmington Morning Star newspaper of the June 11, 1992 Proposed Plan Public Meeting. The Proposed Plan Fact Sheet was mailed to the public on June 8, 1992. The basis of the information presented in the Proposed Plan was the draft FS document dated, May 18, 1992. A press release reminding the public of the upcoming public meeting was also issued on June 8, 1992.

The goals of the Proposed Plan meeting were to review the remedial alternatives developed, identify the Agency's preferred alternative, present the Agency's rationale for the selection of this alternative, encourage the public to voice its own opinion with respect to the remedial alternative selected by the Agency, and inform the public that the public comment period on the Proposed Plan would run from June 11, 1992 to July 13, 1992. The public was also informed a 30 day extension to the public comment period could be requested and that all comments received during the public comment period would be addressed in the Responsiveness Summary.

During the meeting, a request was made for the 30-day extension which extended the public comment period on the Proposed Plan to August 12, 1992. A notice was mailed on July 6, 1992 to addressees on the mailing list informing them of this extension. An ad was also published in the July 8, 1992 edition of the Wilmington Morning Star newspaper informing the public that the public comment period had been extended to August 12, 1992.

6.0 SCOPE AND ROLE OF RESPONSE ACTION WITHIN SITE STRATEGY

The intent of the remedial action presented in this ROD is to restore the aquifer to drinking water quality at this Site. This remedial action involves the extraction and treatment of the contaminated groundwater at the Site. Soils do not need further remediation as the November/December 1990 removal action successfully removed the residual wastes and the contaminated soils. This is the only ROD contemplated for the Site and no other operable units are anticipated.

7.0 SUMMARY OF SITE CHARACTERISTICS

The overall nature and extent of contamination at the Site is based upon analytical results of environmental samples collected from surface and subsurface soils, from the groundwater, and the chemical/physical and geological/hydrogeological characteristics of the area. Environmental samples were collected over a period of time and activities. These activities included the following sampling events: New Hanover County, 1985; State of North Carolina, 1986; removal action in November/December 1990; RI field activities in April 1991, May 1991, and November 1991; and an additional groundwater sampling in July 1992. The majority of these samples were analyzed for the entire target compound list (TCL) and target analyte list (TAL). The TCL includes volatile and semi-volatile organic compounds, pesticides, and polychlorinated biphenyls (PCBs); the TAL includes inorganics such as metals and cyanide. TCL volatile and semi-volatile organic compounds and TAL metals were detected in the environmental media sampled at the Site. No PCBs, pesticides, or cyanide were detected in any of the environmental samples collected at the Site and therefore, these contaminants will not be discussed in the following sections. Based on the history of the Site, no RCRA listed wastes are present at the Site.

An additional sampling effort was conducted by EPA in May 1990 to assess potential contamination at the Site. These data was used to define areas to be addressed during the removal action. These data and other data collected prior to the 1990 removal no longer reflects current conditions at the Site and therefore, these sets of data were not incorporated into this ROD.

Control samples were collected for surface soils, subsurface soils, and groundwater. No surface water or sediment samples were collected as there is very little likelihood that the nearest stream would have been impacted by Site activities. The nearest surface streams to the Site are Smith Creek, 1 mile north (Figure 3), and Northeast Cape Fear River, a little less than 2 miles to the east. Table 1 lists the contaminants detected in each environmental medium sampled at the Site. Contaminants followed by an asterisk (*) are the chemicals of concern. The following sections discuss the results of samples collected at the conclusion of the removal action and the RI.

Air samples were not collected as part of the RI/FS effort. However, the air was monitored during the RI field work as part of the health and safety effort. Based of the information collected, the quality of the air at and around the Site is not currently being adversely impacted by the Site.

Preliminary remediation goals (PRGs) for soils and groundwater were developed by the Agency for contaminants known to be at the Site in January 1991. The PRGs developed for soil contaminants employed the most stringent risk based scenario - having the contaminants present in the surface soils. The groundwater PRGs included State groundwater quality standards, applicable maximum concentration levels (MCLs), and cleanup goals based on the most stringent risk based scenario - ingesting contaminated groundwater. The PRGs were presented in the May 1991 RI Work Plan.

The source of contamination and the resulting contaminated soils were removed by the PRP sponsored removal action in 1990. The analytical data from soil samples collected at the completion of the removal action were utilized in the RI. This data confirms that the removal was successful in removing the contaminated soil.

Contaminants detected in the groundwater included VOCs, semivolatile organic contaminants (SVOCs), and metals. Benzene was the only contaminant consistently detected above Federal MCLs. Benzene, chloroform, 1, 2dichloroethane, and ethylbenzene were detected above State groundwater quality standards. The total volume of groundwater impacted by the Site as estimated to be 9.7 million gallons. The plume of contamination is delineated in Figure 4.

7.1 SOILS

Twenty-seven (27) soil samples collected at the Site were incorporated into the RI report. As stated previously, the analytical data for soil samples collected prior to the 1990 removal action are no longer suitable as they do not reflect current conditions at the Site. Therefore, these samples were not integrated into the RI report or the ROD.

Twenty-one (21) of these soil samples were collected at the completion of the November/December 1990 removal action. Nineteen (19) of which were collected below grade, at the bottom of the excavations prior to filling the excavations in with clean fill. The results of these samples reflect subsurface soil conditions. Two (2) surface soil samples were collected during this time frame. They were collected at the only locations where surface water could possibly leave the Site. This drainage is made possible by the presence of

culverts that run underneath the earthen berm that surrounds the entire Site at these locations (refer to Figure 2). Flow through these culverts will only occur under very heavy downpour conditions. These samples were collected to confirm that no contamination has left the Site via surface water runoff.

The other six (6) soil samples were collected as part of the RI. Five of these soil samples, 2 surface and 3 subsurface, were collected in April 1991. The last soil sample, a surface sample, was collected in November 1991.

7.1.1 SURFACE SOIL

The locations of the five (5) surface soil samples are shown in Figure 5. Samples BP-01 and BP-02 were collected during the removal and samples NH-001 -SC, NH-003-SL, and SED-001, were collected during the RI. The analytical results for these surface soil samples, the frequency the contaminants were detected, and the PRGs for particular contaminants are presented in Table 2.

As stated earlier, there are no on-site surface water features except for occasional periodic wet areas following heavy rains. The perimeter drainage ditch inside the berm surrounding the Site is neither a perennial surface water feature nor does it connect to any surface water drainage feature off-site. Samples BP-01 and BP-02 were collected in the drainage pathway where culverts run underneath the berm. Under very extreme wet weather conditions, these culverts would allow surface water to drain from the Site at these two locations. It was for this reason that these samples were collected here. Although these samples were collected in the culvert drainage pathway, they are considered as surface soil samples. No contamination was detected at location BP-02 and 3 unidentified SVOCs (2.0J mg/kg) were detected at BP-01. This data confirms that no significant quantities of contaminants have migrated off-site via this route.

Total xylene at a concentration of 0.01 milligram/kilogram (mg/kg) and one unidentified SVOC (7.0 mg/kg) was found in sample NH-001-SC, the background/control surface soil sample. NH-003-SL, which was collected near the burn pit area outside the clean fill area, showed no evidence of contamination. This helps verify that the removal achieved its goal of removing contaminated surface soils. Several contaminants, total xylene (0.0069J mg/kg), toluene (0.0061J mg/kg), phenol (0.18J mg/kg), and one unidentified SVOC (3.0 mg/kg) were detected in sample SED-001.

As can be seen in Table 2, all contamination, organic or inorganic, detected in the surface soil samples were considerably below the established PRGs.

7.1.2 SUBSURFACE SOILS

Nineteen (19) subsurface soil samples were collected at the conclusion of the November/December 1990 removal action. These samples were collected to confirm that the removal action successfully removed the soil contamination to concentrations below the PRGs. The majority of the removal excavations were dug down until the underlying saturated zone was encountered which averaged at a depth of 3 feet. The confirmation subsurface soil samples, BP -03 through BP-21,

were composite samples collected from the bottom of the excavation. The sampling locations were selected to deliberately bias the results. The intent of this sampling effort was to represent a "worse case" scenario of Site conditions to ensure that the removal action removed all soils with concentration above the PRGs. The sampling locations are shown in Figure 6. Table 3 presents the analytical results for the contaminants detected in the subsurface soil samples along with the appropriate PRG. Table 4 summarizes the data presented in Table 3 by providing the frequency of detection and the range of concentrations for all the contaminants detected in the subsurface soils.

Three additional subsurface soil samples were collected as part of the RI effort. Their locations are also shown in Figure 6. Sample NH002SL was the subsurface background or control sample. The sample designated NH013SL was collected in an effort to confirm the findings of sample BP-13 and the sample designated as NH-018SL was collected in an effort to confirm the findings of sample BP-18. Both samples BP-13 and BP-18 were collected as part of the removal action. The analytical results for these three samples are also included in Tables 3 and 4.

The PRGs for contaminants known to be present in the soils at the Site are presented in the second column in Table 3. As can be seen in comparing the levels of organics and inorganics detected in the samples collected from the Site to these remediation goals, only one PRG was exceeded. This was for total carcinogenic PAHs in sample BP-21. The PRG for total carcinogenic PAHs is 0.31 mg/kg and the total concentration of carcinogenic PAHs found in sample BP-21 was 0.643 mg/kg. However, two additional samples (BP-18 and NH -018SL) were collected from the same location. Sample BP-18 was a duplicate of BP-21 and NH-018SL was collected during the RI. It is important to note the complete absence of any PAHs in either of these samples.

Due to the presence of several VOCs in sample BP-13, an additional sample, NH-013SL, was collected as part of the RI. Sample NH-013SL was collected at approximately the same location and depth as BP-13. As can be seen in Table 3, only one VOC, ethylbenzene, was detected at a concentration of 0.031 mg/kg. This is significantly below the levels of contamination detected in BP-13.

7.2 GROUNDWATER

Contaminants detected in the groundwater also included VOCs, SVOCs, and metals. Contaminants were found in both the shallow and deep zones of the upper water bearing formation. No monitoring wells (MWs) were completed in the underlying aquifer.

The investigation on the quality of the groundwater occurred in several phases. Initial groundwater samples were collected from temporary monitoring wells installed during the November/December 1990 removal action. The second round of groundwater samples were also collected from temporary wells which were installed as part of the RI in April 1991. The location of these temporary wells are presented in Figure 7. All the analytical data from the temporary wells is presented in Table 5. It is important to note the almost total absence of contaminants in the temporary wells installed during the RI. This data establishes that the plume has not migrated in a south southwestwardly direction. The presumed regional groundwater flow direction which is to the south, towards Smith Creek. The presence of the acetone is attributable to the alcohol used to clean the sampling equipment between sampling events.

Based on the analytical data from the temporary wells, six permanent monitoring wells were installed at the Site later on in the RI. The location of these wells are shown in Figure 8. Four (4) of the wells are deemed shallow as the screened portion intercepts the water table. The screened interval is 5-15 feet below land surface and these wells are designated by "S". The 10 foot screens in the two deeper wells were set on top of the clay layer encountered at the Site at a depth of approximately 30 feet. The deep wells are designated by "D".

Four rounds of groundwater samples have been collected and analyzed from these permanent wells. Full analytical scans were run on all but the second round of samples. Only TCL VOCs were analyzed for in the samples collected during second groundwater sampling event. The analytical data is presented in Table 6 and is summarized in Table 7.

A total of eleven (11) different VOCs were detected in the groundwater; however, the presence of acetone was introduced through field activities and hence, is not considered a Site contaminant. The detection of chloroform may have also been introduced through field activities. Potable water was used in the installation and construction of the monitoring wells at the Site. The potable water was obtained from a fire hydrant connected to the public water supply system and stored in a portable tank kept at the Site. Chloroform was detected in a water sample collected directly from the portable storage tank. This sample was collected and analyzed as part of the quality assurance/quality control effort of the RI.

Benzene, ethylbenzene, and total xylenes were the most frequently detected contaminants as well as being present in the highest concentrations. A total of seven (7) different SVOCs were found in the groundwater. 2,4-Dimethylphenol, naphthalene, and 2-methylnaphthalene were the most frequently detected SVOCs as well as being present in the highest concentrations. Twenty-one (21) metals were detected in the groundwater. They all occur naturally. The high levels of chromium in the April 1991 data is attributable to sediment suspended in the samples. The November 1991 analytical data more closely depicts the actual levels of chromium, as well as the other metals, in the groundwater at the Site. Only the analytical data for the heavy metals (chromium, lead, and mercury) are included in Tables 6 and 7.

As can be seen, the greatest concentrations of organic contaminants including both VOCs and SVOCs, are in the well nest designated MWS-002 and MWD-002. These wells are approximately 50 feet southeast of where the burn pit was located. The highest levels of benzene at 0.11 milligram/liter (mg/l) were detected in both of these wells. 2,4-Dimethylphenol has also been detected in every sample collected from these two wells but at lower concentrations.

Numerous VOCs and SVOCs were also detected in the two control wells, MWS-001 and MWD-001. VOCs detected in MWS-001 include benzene, ethylbenzene, and total xylenes. VOCs detected in MWD-001 included the same VOCs as in MWS-001 and two (2) SVOCs, 2-methylnaphthalene and naphthalene. Because of the radial flow of groundwater at the Site, as is discussed in Section 7.3, this pair of wells do not represent true background conditions. Several organic chemicals were sporadically observed in wells MWS-003 and MWS-004. Figure 4 delineates the plume of groundwater contamination. The metals beryllium and lead were detected in only one (1) groundwater sample which was collected from MWS-001. The concentration for lead, 0.022 mg/l, is just above the MCLs for lead, 0.015 mg/l. Based on these findings, metals are not considered to be significant Site related contaminants. The plume shown in Figure 4 is based on the organic contaminant benzene.

7.3 HYDROGEOLOGICAL SETTING

New Hanover County is located within the Coastal Plain Physiographic Province. Generally, the sequence of rock types beneath New Hanover County consists of unconsolidated and consolidated sedimentary rock of predominantly coastal and marine origin that begin at land surface and unconformably overlie crystalline rock at depth. Potable water supplies are obtained from the relatively shallow sedimentary formations. Groundwater occurring at greater depths is undeveloped due to saline conditions. Groundwater flow associated with the fresh water aquifers beneath New Hanover County are largely effected by topography, surface water features, and the geologic structure.

Regionally, the Site is located on the western side of a north-south trending topographic divide. In the area of the Site, 25 to 31 feet of unconsolidated quartz sand overlies a 5 foot unnamed clay layer (blue clay layer). The precise extent of the clay layer is not known, however, it is believed to be continuous beneath the Site as its presence was confirmed in four locations across the Site. Beneath the blue clay were light gray, medium to coarse grained quartz sand and clay lenses to a depth of approximately 60 feet below land surface. Hard, consolidated, sandy, phosphatic, fossiliferous limestone with calcite filled fractures was encountered underlying these sand and clay lenses. This limestone is believed to be the Castle Hayne Limestone, which ends somewhere in the vicinity of the Site. A clay aquitard separates the sandstone aquifer (Pee Dee) from the Castle Hayne beneath the Site.

The groundwater under the Site is designated as Class GA in accordance with North Carolina's

groundwater classification system and Class IIB under U.S. EPA Groundwater Classification Guidelines (December 1986). The Class GA classification means that the groundwater is an existing or potential source of drinking water supply for humans as defined in Title 15, North Carolina Administrative Code, Subchapter 2L (T15 NCAC 2L). EPA classifies the upper zone of the aquifer (i.e., the groundwater above of the blue clay layer) as Class IIB since the aquifer is of drinking quality but is not currently being used as a source of drinking water. The groundwater beneath the blue clay layer is assumed to be interconnected with the Castle Hayne Limestone formation and is therefore, classified as IIA. Class IIA is defined as a aquifer that is currently being used as a source of drinking water. For these reasons, the groundwater needs to be remediated to a level protective of public health and the environment as specified in federal and state regulations governing the quality and use of drinking water. Both the Pee Dee and the Castle Hayne are major sources of drinking water for New Hanover County.

The permeability of the blue-gray clay unit was determined in the laboratory to be 2.03×10^{-7} centimeters/second (cm/sec). A Site hydrogeologic cross -section B-B' located on Figure 9 and shown in Figure 10 indicates the hydrogeologic units encountered beneath the Site.

The New Hanover Site and surrounding area are topographically and hydraulically bounded by Smith's Creek to the south and southwest, small tributaries to the Northeast Cape Fear River to the north and northeast, and the Northeast Cape Fear River to the west. Essentially, all overland drainage that occurs within this area is toward the Northeast Cape Fear River, which combines flow with the Cape Fear River and eventually discharges to the Atlantic Ocean. From the Site, it is approximately 4,800 feet to the nearest topographically downgradient perennial surface water feature, Smith's Creek. From this point, Smith's Creek meanders to the Northeast Cape Fear River for an overland distance of approximately two miles. From the point of its confluence with Smith's Creek, the Northeast Cape Fear River flows southward for approximately two miles and combines with the Cape Fear River. Flow continues southward for approximately 20 miles until the Cape Fear River discharges to the Atlantic Ocean.

The surface water drainage at the Site is markedly influenced by the surficial sands. The surficial sands are permeable, allowing most precipitation to infiltrate into the sands and recharge the surficial aquifer or become evapotranspired through the grasses growing at the Site. The surficial sands are permeable enough such that overland flow does not occur during most precipitation events.

As stated previously, the entire Site is surrounded by elevated roads which form a berm around the Site. Outside of the elevated roads is a perimeter ditch. Although perimeter ditches and drainage culverts are present, surface water runoff from the Site does not occur. It is estimated that 90 percent of the precipitation effectively recharges the undifferentiated deposits with the remaining 10% evaporating.

The upper water bearing formation is under water table or atmospheric conditions. The water table elevation at the Site is approximately 27 to 28 feet above NGVD29 (National Geodetic Vertical Datum of 1929). Typical depths to the water table ranged from approximately 2.3 to 3.8 feet below land surface. Figure 11, 12, and 13 present the static water table elevations observed at the Site. Groundwater elevations near the middle of the Site indicate a somewhat mounded water table condition. This may be due to the recent removal activities which may have altered the hydraulic properties of the Site soils at the former pits. The estimated hydraulic gradient across the Site was observed to range between 0.0008 feet/feet on 04/09/91 to 0.00002 feet/feet on 05/07/91. The horizontal groundwater velocity in the upper water bearing zone (above the blue clay layer) is 9.9 feet/year. The regional groundwater flow direction is generally to the south. The groundwater below the blue clay layer is under confined conditions but since no monitoring wells were installed below this formation during the RI, no specific information was collected on the properties of this aquifer.

7.4 PATHWAYS AND ROUTES OF EXPOSURE

Table 8 lists the chemicals of concern and why these particular constituents are considered chemicals of concern at the New Hanover Site. The chemicals of concern include VOCs and metals. These chemicals of concern pertain to the groundwater only.

An exposure pathway is the route or mechanism by which a chemical agent goes from a source to an individual or population. Each exposure pathway includes the following:

A source and mechanism of chemical release to the environment,

A transport medium (e.g., soil or groundwater),

An exposure point (where a receptor will contact the medium), and

An exposure route (i.e., ingestion, inhalation, or dermal contact).

A pathway is considered complete when all of the above elements are present. Table 9 summarizes the evaluation of potential exposure pathways for the New Hanover Site

The two transport mechanisms most likely to occur at the New Hanover Site are air and groundwater. Air could become an exposure pathway due to the volatilization of contaminants from the water when a person takes a bath or shower. Groundwater would also become an exposure pathway if the contaminated groundwater is used as potable water.

Based on the information collected during the RI, neither of these two transport mechanisms are presently occurring. Therefore, there are no current unacceptable risks presented by the Site. As can be seen, the only potential risks are future risks associated with use of the contaminated groundwater as a source of potable water.

8.0 SUMMARY OF SITE RISKS

CERCLA directs that the Agency must protect human health and the environment from current and future exposure to hazardous substances at Superfund sites. In order to assess the current and future risks from the New Hanover Site, a baseline risk assessment was conducted in conjunction with the RI. This section of the ROD summarizes the Agency's findings concerning the impact to human health and the environment if contaminated media (i.e., groundwater) at the Site were not remediated. The baseline risk assessment for this Site is presented as a stand alone document in the New Hanover administrative record.

8.1 CONTAMINANTS OF CONCERN

Table 8 provides a comprehensive list of the contaminants identified as chemicals of potential concern at the Site in the groundwater. The contaminants of concern consist of four (4) VOCs and two (2) metals.

Table 10 provides the reasonable maximum exposure concentrations which were used in calculating the carcinogenic and noncarcinogenic risks associated with each chemical of concern.

The chemicals of concern listed in Table 8 were found in the groundwater. The extent of the plume was shown in Figure 4 and the range of concentrations, including the maximum concentration for each contaminant detected in the groundwater at the Site was presented in Table 7. The contaminants included in Table 8 were contaminants whose concentrations exceed established applicable or relevant and appropriate requirements (ARARs).

When firefighting exercises were discontinued, the Site became inactive. The Site is on property under the direction of the New Hanover Airport authority; consequently, there is no current onsite land use. According to the 1989 Master Plan for the airport, the Site is in an area which is designated for industrial development.

There are residents within a three-mile radius to the Site who obtain drinking water from private wells. The nearest private potable wells are approximately 2,000 feet from the Site. However, these wells are typically completed in the lower fresh water bearing formations such as the Castle Hayne Limestone and Pee Dee formation, as the groundwater in the shallow zone contains high levels of dissolved inorganic constituents (i.e., sulfates).

8.2 EXPOSURE ASSESSMENT

The objective of the exposure assessment is to estimate the type and magnitude of potential exposures to the chemicals of concern that are present at the Site. The results of the exposure assessment are combined with chemical specific toxicity information to characterize potential risks.

There are no current receptors as the 1990 removal eliminated any surface contamination and the contaminated groundwater remains on Site, therefore the contaminated groundwater is not being used as a source of potable drinking water. The primary future human receptors at the Site may be offsite residents (adult and children) through the use of contaminated groundwater as a potable source of water. Although, the impacted groundwater is not currently being used as a drinking water source, EPA and the State of North Carolina have classified the aquifers underlying the Site as Class II-A/II-B and GA aquifers, respectively. Therefore, these resources should be maintained at drinking water quality.

Table 11 provides a summary of the exposure and intake assumptions which were used in the baseline risk assessment.

8.3 TOXICITY ASSESSMENT

The toxicity assessment was conducted to further determine the potential hazard posed by the chemicals of concern for which exposure pathways have been identified. Available evidence is weighed in regards to the potential of particular contaminants to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects.

Cancer slope factors (CSFs) have been developed by EPA's carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of milligrams/kilogram/day⁻¹ [(mg/kg/day)⁻¹], are multiplied by the estimated intake of a potential carcinogen, in (mg/kg/day), to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CSFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic (systemic) effects. RfDs, which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, which will result in no adverse health effects. Estimated intakes of chemicals from environmental media (i.e., the amount of chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (i.e., to account for

the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The Agency has derived CSFs and RfDs for the contaminants of concern at the Site for use in determining the upper-bound level of cancer risk and non-cancer hazard from exposure to a given level of contamination. These values are provided in Table 12.

8.4 RISK CHARACTERIZATION

The risk characterization step of the baseline risk assessment process integrates the toxicity and exposure assessments into quantitative and qualitative expressions of risk. The output of this process is a characterization of the site-related potential noncarcinogenic and carcinogenic health effects.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may be reasonably exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The HQs and HIs for the exposure pathways (current and future) identified at the Site are summarized in Table 13.

The HQ is calculated as follows:

Non-cancer $HQ = CDI/R[f]D$, where:

CDI = Chronic Daily Intake $R[f]D$ = reference dose; and CDI and $R[f]D$ are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or shortterm).

For carcinogens, risk are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

Risk = $CDI \times SF$, where:

Risk = a unit less probability (e.g., 2×10^{-5}) of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and

SF = slope-factor, expressed as (mg/kg-day) $^{-1}$

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6} or $1E-6$). An excess lifetime cancer risk of $1E-6$ indicates that, as a plausible upper-bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

EPA has set an acceptable carcinogenic risk range of $1E-4$ to $1E-6$, but prefers that remediation of Superfund sites achieve a residual cancer risk no greater than $1E-6$. However, depending upon site factors, a risk of $1E-4$, may be considered protective.

The carcinogenic upper-bound risk for each of the exposure pathways (current and future) identified at the Site are summarized in Table 13. The accumulative future risk and hazard index posed by the Site is 1×10^{-4} and <1 , respectively.

8.5 RISK UNCERTAINTY

There is a generally recognized uncertainty in human risk values developed from experimental data. This is primarily due to the uncertainty of extrapolation in the areas of (1) high to low dose exposure and (2) animal data to values that are protective of human health. The Site specific uncertainty is mainly in the degree of accuracy of the exposure assumptions.

The risk assessment is aimed at providing a conservative estimate of risk for the Site. A number of uncertainty and assumptions made throughout the risk assessment are likely to result in an overall overestimation rather than an underestimation of risk. Soil samples may not necessarily be representative of the Site in its present condition. It is likely that all contaminated soils were removed in the PRP remediation and that surficial soils may not pose a risk, however, since there is a lack of surficial soil data this could not be verified. The exposure scenario also involves a number of uncertainties. Consumption of 2 liters of contaminated drinking water per day for 350 days a year represents the upper bound of potential exposure and has been used because site-specific data were not available. This may be an overestimation of the actual exposure that may occur in the future. The scenario assumes that an adult is consistently being exposed to the same concentrations for 30 years. The daily intake by ingestion is reported as being equal to the daily intake by ingestion; the use of this assumption yields an almost equal risk for the inhalation scenario. Dermal absorption of vapor

phase chemicals is considered to be lower than inhalation intakes in many instances and is not considered in this risk assessment.

As a result of the uncertainties and assumptions described above, the risk assessment is a conservative analysis intended to indicate the potential for adverse impacts to occur and not an absolute estimate of risk to humans or a specific population.

8.6 ECOLOGICAL RISK

An endangered species survey was conducted at the Site on April 15 and 16, 1991. Observations were scheduled from 5:00 a.m. in the morning to 7:00 p.m. in the evening in order to encompass both nocturnal and diurnal fauna foraging. Floral observations were conducted during the mid-morning and midafternoon to maximize observation time. No endangered flora or fauna species were identified during this survey. The flora diversity is typical for a coastal range area which has undergone significant disturbance, remediation, and subsequent revegetation. Grasses are the dominant vegetation at the Site interspersed with wild strawberries, hay-scented fern, and poison ivy. The fringe (ecotone) immediately adjacent to the Site is dominated by scrubs including magnolia, poison sumac, southern bayberry, and red maple. The dominant fauna observed were opossum, lizard and aerial (passerine) species. Species diversity was limited due to poor habitat suitability and stress, e.g. reforestation and urban impact including light industry, roads, and housing adjacent to or nearby the Site.

8.7 SUMMARY

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment. Presently, no unacceptable current or future risks were identified associated with the New Hanover Site; however, concentrations of contaminants in the groundwater are above federal maximum concentration levels and state groundwater quality standards.

The health risk posed by this NPL site is primarily from the future use of the groundwater as a potable source. This is due to the presence of contaminants at concentrations above EPA's MCLs for drinking water and the State of North Carolina groundwater quality standards. These contaminants will be remediated during the remedial action phase.

Presently, there is no known adverse impact on the eco-system resulting from the Site.

9.0 DESCRIPTION OF ALTERNATIVES

As stated previously, the 1990 removal action successfully remediated the Site's soils and therefore, a "No Action" alternative was the alternative developed for soils.

Table 14 inventories those technologies that passed the initial screening for remediating the contaminated groundwater. In the initial screening, process options and entire technologies were eliminated from consideration if they are difficult to implement due to Site constraints or contaminant characteristics, or if the technology has not been proven to effectively control the contaminants of concern. Table 14 also presents the results of the final screening of the groundwater remediation technologies. Effectiveness, implementability, and relative capital and operation and maintenance costs are the criteria used for evaluating the technologies and process options in the final screening. Table 14 provides the rationale as to why certain technologies were not retained for the detailed comparison. The process options that were eliminated in the final screening are shaded.

The No Action alternative for soil and the retained five (5) groundwater remediation alternatives to address the estimated 9.7 million gallons of contaminated groundwater are described below. As stated earlier, neither surface water nor sediment remediation technologies were evaluated as these environmental media do not exist at or near the Site and hence, have not been adversely impacted by Site activities.

9.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The environmental setting and the extent and characterization of the contamination at the New Hanover Site were defined in Section 7.0. Section 8.0 highlighted the human health and environmental risks posed by the Site. Table 8 lists the contaminants of concern observed in the groundwater at the Site. This Section examines and specifies the cleanup goals for the contaminants in the groundwater.

9.1.1 Action-Specific ARARs

Action-specific requirements are technology-based and establish performance, design, or other similar action-specific controls or regulations on activities related to the management of hazardous substances or pollutants. Table 15 lists all potential action-specific applicable or relevant and appropriate requirements (ARARs).

9.1.2 Chemical-Specific ARARs

Chemical-specific ARARs are concentration limits established by government agencies for a number of contaminants in the environment. Chemical-specific ARARs can also be derived in the Risk Assessment. Table 16 lists all of the potential chemical-specific ARARs which may be pertinent at the New Hanover Site. Discussed below is each environmental medium investigated at the New Hanover Site as part of the RI and the associated chemical-specific ARARs.

As stated earlier, the 1990 PRP sponsored removal action successfully remediated Site soils. Therefore, no additional cleanup goals, other than the PRGs, were developed for Site soils.

As declared previous, the groundwater at the New Hanover Site is designated as Class GA by the State and Class IIA/IIB by EPA. Since the groundwater above the blue clay layer is a potential source of drinking water and the groundwater below this layer is a source of drinking water, the groundwater needs to be remediated to a level protective of public health and the environment.

The Safe Drinking Water Act (SDWA) and North Carolina Administrative Code, Title 15, Subchapter 2L (NCAC T15:02L.0202) establish MCLs and non-zero maximum contaminant level goals (MCLGs) for numerous organic and inorganic constituents. For contaminants that do not have either a federal or state cleanup goal, risk-based remediation goal numbers were calculated. The cleanup goals to be obtained at the New Hanover Site along with the source for the stated goals are shown in Table 17. This table lists the most stringent state or federal requirements.

9.1.3 Location-Specific ARARs

Location-specific ARARs are design requirements or activity restrictions based on the geographical and/or physical positions of the Site and its surrounding area. These requirements and/or restrictions can be stipulated by federal, state, or local governments. Table 18 lists the location-specific ARARs that apply at the New Hanover Site.

9.2 REMEDIAL ALTERNATIVES TO ADDRESS SOIL CONTAMINATION

The "No Action" alternative was the only alternative included for the soils at the New Hanover Site. This was made possible by the success of the 1990 removal action which effectively removed the source along with the contaminated soils.

9.3 REMEDIAL ALTERNATIVES TO ADDRESS GROUNDWATER CONTAMINATION

Five (5) alternatives were developed to address groundwater contamination at the Site. They are:

Alternative GW1: No Action with Long Term Monitoring

Alternative GW2: Vertical Barrier/Cap

Alternative GW3: Groundwater Extraction and Physical Treatment (Air Stripping) with Discharge

to a Publicly Owned Treatment Works (POTW)

Alternative GW4: Groundwater Extraction and Physical/Chemical Treatment (Chromium Reduction, Metals Precipitation, and Air Stripping) with Discharge via Spray Irrigation

Alternative GW5: Groundwater Extraction and Physical/Chemical Treatment (Chromium Reduction and Metals Precipitation) with Discharge to Surface Water (Smith Creek)

The costs proposed for the following remedial alternatives were developed using a discount rate of 10 percent over 30 years.

9.3.1 Alternative GW1: No Action

The No Action alternative is included, as required by CERCLA and the National Contingency Plan (NCP), to serve as a baseline for comparing the benefits achieved through the other groundwater remediation measures. Under the No Action alternative, the Site would be left "as is" without conducting any further remedial actions. However, long term monitoring of existing monitoring wells would be conducted to track changes in environmental quality over an estimated 30-year period.

A reduction in the levels of contamination may occur over time through natural processes. If no biodegradation occurs, it is estimated that the levels of benzene in the groundwater would remain above the groundwater cleanup goal for over 100 years.

Although there is no current unacceptable risk associated with the contaminated groundwater, this situation would change immediately if either a potable well was installed near to or on the Site or if the plume migrates northwest towards the private potable wells in the neighborhood located 1,100 feet in that direction. The reason there is no current risk is because nobody in the vicinity of the Site is using the groundwater as a source of drinking water. However, if a potable well was installed in or near the plume, the risk would increase to 1×10^{-4} . Since this alternative does not involve any treatment or other remedial action, any reduction in the mobility, toxicity, or volume (MTV) of the contaminants in the groundwater at the Site would be the result of natural processes.

The No Action alternative could be readily implemented, and would not hinder any future remedial actions. There are no capital costs associated with this alternative; however, O&M costs would be incurred. O&M costs would include the costs associated with the long-term monitoring effort and the need to conduct long-term effectiveness and permanence reviews every five years when hazardous materials are left at a site as required by Section 121(c) of CERCLA.

Capital Costs:

	\$ 0
PW O&M Costs:	\$215,000
Total PW Costs:	\$215,000

Time to Implement:	None
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Estimated Period of Operation:	30 years
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9.3.2 Alternative GW2: Vertical Barrier/Cap

This alternative involves containing the groundwater plume with a vertical barrier (i.e., slurry wall) and the construction of an impermeable cap to prevent precipitation to cause groundwater mounding within the area encompassed by the vertical barrier. The vertical barrier would be accomplished by employing a slurry wall to a depth of approximately 30 feet. The slurry wall would be anchored in the 5 foot blue clay layer encountered under the Site. Restrictions on future land use would be warranted.

Periodic sampling of the groundwater would take place in order to monitor changes in both contaminant concentrations as well as defining the migration of the plume. The need for additional monitoring and the frequency of the sample monitoring would be resolved in the

Remedial Design (RD).

The capital costs include the installation of the slurry wall and the construction of the cap. O&M costs would include maintenance of the cap, periodic groundwater sampling, and the costs for conducting the 5 year reviews as required by Section 121(c) of CERCLA.

Capital Costs:	\$ 925,900
PW O&M Costs:	\$ 161,000
Total PW Costs:	\$1,087,700

Time to Implement: 6 months for design and contractor selection/8 months to construct

Estimated Period of Operation: 30 years

9.3.3 Alternative GW3: Groundwater Extraction and Physical Treatment (Air Stripping) with Discharge to POTW

This alternative involves the installation of a groundwater extraction system to remove the 9.7 million gallons of contaminated groundwater, an air stripping step to remove the VOCs, and discharging the treated groundwater to the Northside POTW which is owned and operated by the City of Wilmington. Groundwater would be extracted from within the plume and pumped to an onsite treatment system. It is anticipated that the groundwater recovery system will need three (3) extraction wells, each pumping at a rate of 5 gallons per minute (gpm), to achieve the groundwater remediation. The air stripper will achieve cleanup goals to meet the "below detection limit" for benzene (i.e., 1.0 ug/l) requirement for discharge to the POTW. Treated groundwater would flow from the air stripper to a sewer connection to the POTW. The point of compliance for this alternative is the extent the plume has traveled in the aquifer where levels of contaminants are above the cleanup goals specified in Table 17.

Pretreatment of the groundwater may be required to remove total suspended solids (TSS) and iron prior to air stripping. Pretreatment may consist of clarification/equalization basins or multi-media filters to remove TSS followed by either greensand filters or the addition of proprietary chemical complexing agents to prevent iron from precipitating in the air stripping tower. The sludge generated by this pretreatment step is typically nonhazardous. It will be tested to verify that it is non-hazardous. After testing, the sludge will be disposed of in the most economical means. For costing purposes, the use of a pretreatment system is included to avoid fouling of the air stripper. It is assumed that no air quality control equipment will be needed to capture VOCs released from the air stripper due to their low concentrations in the groundwater.

Even though two (2) heavy metals, chromium and lead, were included in the list of chemicals of concern, no treatment step to remove these metals from the extracted groundwater has been included in the treatment train for this alternative. No treatment to remove these metals is warranted as the analytical data presented Tables 5 and 7 clearly show that these metals are below background levels and are not Site related. If these metals were Site related contaminants, then they would have been detected more than once and at levels significantly above those detected at this Site. Refer to Section 7.2 for the explanation of elevated chromium levels in the April 1991 groundwater data.

The following work/information will need to be performed/generated in the RD: additional groundwater modeling and aquifer testing, a treatability study to size the groundwater treatment equipment, a resolution if a pretreatment step is necessary and the specific technology to be used in the pretreatment step, and a determination of how to dispose of any waste streams generated by the Remedial Action (RA). Additional hydrogeological information is needed to insure the extraction wells will accomplish their goals.

Capital Costs:	\$ 859,100
PW O&M Costs:	\$1,073,700
Total PW Costs:	\$1,932,800

Time to Implement: 6 months for design and contractor selection/2 months to construct

Estimated Period of Operation: 4.5 years

9.3.4 Alternative GW4: Groundwater Extraction and Physical/Chemical Treatment (Chromium Reduction, Metals Precipitation, and Air Stripping) with Discharge via Spray Irrigation

This alternative involves installing a groundwater extraction system to remove the 9.7 million gallons of contaminated groundwater, chromium reduction, metals precipitation, VOC removal using air stripping, and onsite discharge by spray irrigation. Groundwater would be extracted by the same extraction system specified in Section 9.3.3. The point of compliance for this alternative is identical to the point of compliance specified for Alternative GW3.

The treatment train for the extracted groundwater would consist of a chromium reduction; metals precipitation using sodium hydroxide, flocculation, clarification, and filtration; and air stripping to meet State requirements for ultimate groundwater discharge via onsite spray irrigation.

The settled sludge from the metals removal step would be pumped to a filter press. The water recovered from the dewatering operation would be recycled to the treatment's influent stream, and the concentrated sludge/filter cake analyzed and disposed offsite at a hazardous or solid waste landfill, as applicable. The treated effluent from the filter would be discharged to the air stripper to remove the VOCs. Following the air stripper, the treated groundwater would then be pumped to the onsite spray irrigation system. Operation of the extraction system during wet weather or freezing temperature conditions requires provisions for sufficient storage of treated groundwater.

The following information will be generated in the RD: additional groundwater modeling and aquifer testing to insure the extraction wells will accomplish their goals, evaluate adequacy of existing groundwater monitoring system and install additional monitoring wells if necessary, a treat ability study to size the equipment to treat the extracted groundwater, and a determination on what to do with the typically non-hazardous sludge generated by the metalsremoval step and the typically hazardous waste stream created by the chromium removal process.

Capital Costs:	\$1,053,900
PW O&M Costs:	\$1,265,200
Total PW Costs:	\$2,319,100

Time to Implement: 6 months to design and select contractor/3 months to construct

Estimated Period of Operation: 4.5 years

9.3.5 Alternative GW5: Groundwater Extraction and Physical/Chemical Treatment (Chromium Reduction and Metals Precipitation) with Discharge to Surface Water

This alternative involves the installation of a groundwater extraction system to remove the 9.7 million gallons of contaminated groundwater, chromium reduction and metals precipitation, and discharge of the treated groundwater to Smith Creek located approximately 4,000 feet south of the Site. The groundwater extraction system would be identical to that described in Section 9.3.3. The metals removal process is defined in Section 9.3.4. Following the removal of the metals, the treated groundwater would be piped and discharged into Smith Creek via an NPDES permit. The point of compliance is the same as specified in Alternatives GW3 and GW4. The RD would need to develop the same range of information as described in Alternative GW4.

Capital Costs:	\$1,132,500
PW O&M Costs:	\$1,194,500
Total PW Costs:	\$2,327,000

Time to Implement: 6 months for design and contractor selected/4 months to construct and obtain NPDES permit

Estimated Period of Operation: 5 years

10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 9.0 describes the remedial alternatives that were evaluated in the detailed analysis of alternatives set forth in the Remedial Investigation and Feasibility Study Reports. This section summarizes the detailed evaluation of these remedial alternatives in accordance with the nine (9) criteria specified in the NCP, 40 CFR Section 300.430(e)(9)(iii). This section only summarizes the comparison of the groundwater remedial alternatives as the "No Action" remedial alternative was selected for the soils.

10.1 THRESHOLD CRITERIA

In order for an alternative to be eligible for selection, it must be protective of both human health and the environment and comply with ARARs; however, the requirement to comply with ARARs can be waived in accordance to 40 CFR Section 300.430(f)(1)(ii)(C). Table 19 summarizes the evaluation of the (five) 5 groundwater remedial alternatives with respect to the threshold criteria.

10.1.1 Overall Protection of Human Health and the Environment

This criterion assesses the alternatives to determine whether they can adequately protect human health and the environment from unacceptable risks posed by the contamination at the Site. This assessment considers both the short-term and long-term time frames.

As documented in the RI, no surface waters or sediments have been or could adversely impacted by the Site. As a result of the 1990 removal action, Site soils do not pose an unacceptable risk to either human health or the environment under either current or future conditions at the Site.

Under current conditions, the groundwater does not pose an unacceptable risk to human health or the environment. And in contemplating future use scenarios for the Site in the Risk Assessment, the scenario that typically results in manifesting the most protective risk, using contaminated groundwater as potable water, the overall risk posed by the New Hanover Site is 1×10^{-4} .

Because the future risk posed by the contaminated groundwater is 1×10^{-4} , all five groundwater alternatives would be protective of human health and the environment. However, as specified below the levels of contamination in the groundwater exceed applicable or relevant and appropriate requirements for groundwater.

10.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

This criterion assesses the alternatives to determine whether they attain ARARs under federal and state environmental laws, or provide justification for waiving an ARAR. Section 9.1 defines the three types of ARARs: action-specific, chemical-specific, and location-specific. Site-specific ARARs are identified below.

MCLs and State groundwater quality standards are ARARs for Site groundwater. By leaving contaminants above MCLs in the groundwater, neither Alternative GW1 nor GW2 would comply with these ARARs. Therefore, these alternatives would not achieve the requirements of the NCP. Alternative GW3 through GW5 would attain ARARs throughout the entire Site. Construction of the groundwater recovery, treatment, and discharge system for Alternatives GW3 through GW5 would satisfy action-specific ARARs. The disposal of any sludge generated by the groundwater treatment system will also comply with the appropriate ARARs.

10.2 PRIMARY BALANCING CRITERIA

These criteria are used to evaluate the overall effectiveness of a particular remedial

alternative. This evaluation is summarized in Table 20.

10.2.1 Long-Term Effectiveness and Permanence

This criterion assesses the long-term effectiveness and permanence an alternative will afford as well as the degree of certainty to which the alternative will prove successful.

Under Alternatives GW1 and GW2, groundwater contamination would not be actively remediated; therefore these alternatives cannot be considered to be permanent or effective remedial solutions. The long-term effectiveness of these two alternatives is questionable, because of the time it would require for "Nature" to clean "Itself". These remedies would rely on the natural attenuation and the flowing groundwater to eventually remove all the contaminants that have entered the groundwater at the Site. In effect, Alternative GW2 would reduce the effectiveness of the natural attenuation process.

Contaminant concentrations in the groundwater will be permanently reduced through the groundwater extraction and treatment systems specified in Alternatives GW3 through GW5.

10.2.2 Reduction of Mobility, Toxicity, or Volume

This criterion assesses the degree to which the alternative employs recycling or treatment to reduce MTV of the contaminants present at the Site.

Alternatives GW1 would not significantly reduce the mobility, toxicity, or volume of contaminants in groundwater. Alternative GW2 would reduce the mobility of the contaminants in the groundwater by impeding the natural flow of groundwater through the use of a slurry wall and cap. Alternatives GW3 through GW5 would effectively reduce the mobility and volume of contaminants in the aquifer through the groundwater recovery system. The groundwater treatment processes for Alternatives GW3 and GW4 would completely comply with the statutory preference for alternatives that reduce toxicity of contaminants. Alternative GW5 would treat for metals, however, no definitive treatment to reduce the toxicity of the organic contaminants is included in this alternative.

10.2.3 Short-Term Effectiveness

This criterion assesses the short-term impact of an alternative to human health and the environment. The impact during the actual implementation of the remedial action is usually centered under this criterion.

All of the groundwater remediation alternatives can be implemented without significant risk to the community or on-site workers and without adverse environmental impacts.

10.2.4 Implementability

This criterion assesses the ease or difficulty of implementing the alternative in terms of technical and administrative feasibility and the availability of services and materials.

None of the groundwater remediation alternatives pose significant concerns regarding implementation. Design of the treatment systems for Alternatives GW2 through GW5 cannot be completed until the discharge requirements are defined. This determination is dependent on where the treated groundwater will be discharged to. This decision will be finalized in the RD.

10.2.5 Cost

This criterion assesses the cost of an alternative in terms of total present worth cost (PW). Total PW was calculated by combining the capital cost plus the PW of the annual O&M costs. Capital cost includes engineering and design, mobilization, Site development, equipment, construction, demobilization, utilities, and sampling/analyses. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and groundwater monitoring. The PW of an alternative is the

amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including O&M and future replacement of capital equipment.

Total present worth costs for the soil alternative are:

Alternative SS1 - No Action	\$	0
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Table 21 presents the total present worth costs for the groundwater remediation alternatives.

10.3 MODIFYING CRITERIA

State and community acceptance are modifying criteria that shall be considered in selecting the remedial action.

10.3.1 State of North Carolina Acceptance

The State of North Carolina has reviewed and provided EPA with comments on the reports and data from the RI and the FS. NCDEHNR has also reviewed the Proposed Plan and EPA's preferred alternative and conditionally concurs with the selected remedy as described in Section 11.0.

10.3.2 Community Acceptance

The Proposed Plan Fact Sheet was distributed to interested residents, to local newspapers and radio and TV stations, and to local, State, and Federal officials on June 8, 1992. The Proposed Plan public meeting was held in the evening of June 11, 1992. The public comment period on the Proposed Plan began June 11, 1992 and closed on August 12, 1992.

Only written comments submitted by a PRP were received during the public comment period. The questions asked during the June 11, 1992 public meeting and the Agency's response to the written comments are summarized in the Responsiveness Summary, Appendix A. Since no input was received from the community at large, it is infeasible to assess the community's acceptance of the proposed remedy.

11.0 DESCRIPTION OF THE SELECTED REMEDY

Alternative SS1 was selected for the soil and Alternative GW3 for groundwater. Briefly, the selected remedy for this Site is:

- no further action for Site soils;
- a one year period for the collection of additional data on the quality of the groundwater;
- design and implementation of the groundwater remediation to be initiated after the year of groundwater monitoring. The selected groundwater remediation alternative consists of a groundwater extraction system, an air stripping process to remove volatile organics, and a pipeline discharging the treated groundwater to the Northside POTW system; and
- a review of the existing groundwater monitoring system to insure proper monitoring of groundwater quality and the effectiveness of the groundwater extraction system. Additional monitoring wells will be added to mitigate any deficiencies.

This remedy will reduce the levels of contamination in the groundwater to below their Federal MCLs and State water quality standards.

11.1 PERFORMANCE STANDARDS TO BE ATTAINED

Performance standards include any applicable or relevant and appropriate standards/requirements, cleanup levels, or remediation levels to be achieved by the remedial action. The performance standards to be met/attained by the New Hanover remedial action include the following tables and

Table 22:

- action-specific ARARs are inventoried in Table 15,
- chemical-specific ARARs are inventoried in Table 16, and
- location-specific ARARs are inventoried in Table 18.

Table 22 provides the remediation goals to be achieved at this Site. This table also lists the risk level associated with each remediation goal. These risks are based on the reasonable maximum exposure (RME) levels and summarizes the information provided in Tables 10, 11, 12, 13, and 17.

11.2 GROUNDWATER REMEDIATION

The groundwater remediation alternative selected for the New Hanover Site is Alternative GW3 - Groundwater Extraction and Physical Treatment (Air Stripping) with Discharge to POTW. A description of the selected remedial alternative follows.

The contaminated aquifer will be remediated until the performance standards specified in Table 22 are achieved. Figure 4 delineates the estimated periphery of the plume emanating from the New Hanover Site. Following treatment of the extracted groundwater, the groundwater will be discharged into a sewer connection to the Northside POTW which is owned and operated by the City of Wilmington. A sewer line exists along the perimeter roads to the New Hanover County Airport.

It is anticipated that three (3) extracting wells, each pumping at a rate of five (5) gpm will be necessary to achieve and maintain a sufficient drawdown in the underlying aquifer to contain and remove the plume of contamination. The extraction wells will be located within and near the periphery of the

plume. The extracted groundwater will be treated in an aboveground, on-site air stripper. A pretreatment step may be necessary to remove TSS and iron to prevent fouling of the air stripper; however, due to the anticipated short duration that the groundwater extraction system and air stripping unit may be in operation, fouling of the air stripper may not be an impediment. The necessity of a pretreatment step as well as the number, placement, and pumping rate of the extraction wells will be determined in the RD. The air stripper will be designed to achieve a less than 1 ug/l level of benzene in the effluent. This "less than 1 ug/l" (i.e., below detection) of benzene concentration is a pretreatment requirement specified by the POTW. The groundwater treatment process described above is not anticipated to generate any byproducts or waste streams.

Due to the possibility that biodegradation of the organic contaminants in the groundwater is occurring, the design of the groundwater extraction, treatment, and discharge parameters will not be started until after one additional year of data on groundwater quality is collected.

The goal of this remedial action is to restore the groundwater to its beneficial use, as defined in Section 7.3. Based on information obtained during the RI, and the analysis of all of the remedial alternatives, EPA and the State of North Carolina believe that the selected remedy may be able to achieve this goal. Groundwater contamination may be especially persistent below and just downgradient to where the burn pit use to be located, where concentrations are relatively high. The ability to achieve cleanup goals at all points throughout the area of attainment, or plume, cannot be determined until the extraction system has been implemented, modified as necessary, and plume response monitored over time. If the selected remedy cannot meet the specified performance standards, at all of the monitoring points during implementation, the contingency measures and goals described in this section may replace the selected remedy and goals for these portions of the plume.

Such contingency measures will, at a minimum, prevent further migration of the plume and include a combination of containment technologies and institutional controls. These measures are considered to be protective of human health and the environment, and are technically practicable

under the corresponding circumstances. The selected remedy will include groundwater extraction for an estimated period of 4 years, during which time the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the followings:

- a) at individual wells where cleanup goals have been attained, pumping may be discontinued;
- b) alternating pumping at wells to eliminate stagnation points
- c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into groundwater;
- d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup continues to be maintained, the aquifer will be monitored at those wells where pumping has ceased on an occurrence of every 1 year following discontinuation of ground water extraction.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use, all of the following measures involving long term management may occur, for an indefinite period of time, as a modification of the existing system:

- a) engineering controls such as physical barriers, or long-term gradient control provided by low level pumping, as contaminant measure;
- b) chemical-specific ARARs may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;
- c) institutional controls may be provided/maintained to restrict access to those portions of the aquifer which remain above remediation goals;
- d) continued monitoring of specified wells; and
- e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at 5 year intervals in accordance with CERCLA Section 121(c).

11.3 ADDITIONAL CONDITIONS/ADDITIONAL DATA REQUIREMENTS/MONITOR EXISTING CONDITIONS

In addition to delineating the work described above, this ROD and the RD will also have to address a number of additional information/data requirements.

Since the RI was not able to completely delineate the extent of the groundwater contamination, especially in the aquifer below the blue clay layer, additional monitoring wells will need to be installed during the RD. At a minimum, this effort will include the installation of at least two (2) deep monitoring wells, completed below the blue clay layer. The analytical data generated from samples collected from these deep wells will provide sufficient information to determine if contaminants in the upper aquifer have migrated into this lower aquifer. The placement of these and any additional monitoring wells will be made after a review and evaluation of the existing groundwater monitoring system. This review is to insure that the groundwater monitoring system will provide adequate information to assess the long-term quality of the groundwater and to demonstrate the effectiveness of the groundwater extraction system. This review effort may also include additional groundwater modeling and aquifer testing. If a contaminant is found above its groundwater remediation standard specified in Table 22, then the groundwater extraction system will be extended to include this lower aquifer and all the requirements specified in Sections 11.0, 11.1 and 11.2 of this ROD will apply to the remediation of this lower aquifer. In order to help establish a broader data base on groundwater quality and establish whether or not

biodegradation of the contaminants in the groundwater is occurring, additional groundwater samples will be collected and analyzed. Sampling will occur every four (4) months. These samples shall be collected and analyzed for TCL VOCs and TAL metals.

11.4 COST

The total present worth costs for the selected alternative is \$1,932,800. The break down of this cost is specified below.

The present worth cost components of the extraction, air stripping, and discharging to the local POTW are:

TOTAL CONSTRUCTION COST	\$ 859,100
PRESENT WORTH O&M COST	\$1,073,700
 TOTAL PRESENT WORTH COST	 \$1,932,800

12.0 STATUTORY DETERMINATION

The selected remedy satisfies the requirements of Section 121 of CERCLA.

12.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will permanently treat the groundwater. Dermal, ingestion, and inhalation contact with Site contaminants will be eliminated and risks posed by continued groundwater contamination will be abated.

12.2 COMPLIANCE WITH ARARs

The selected remedy will be designed to meet all Federal or more stringent State environmental laws. A complete discussion of the ARARs which are to be attained is included in Sections 9.1. These sections also describe the TBC requirements.

12.3 COST-EFFECTIVENESS

The selected groundwater remediation technology is more cost effective than the other acceptable alternatives considered. The selected remedy will provide greater benefit for the cost because it permanently removes the contaminants from the impacted aquifer.

12.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of: long-term effectiveness and permanence; reduction in mobility, toxicity, or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance; and the statutory preference for treatment as a principal element.

12.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The preference for the treatment of contaminated groundwater is satisfied by the use of the groundwater extraction system and air stripper to remove volatile contaminants from the groundwater at the Site. Further treatment of the discharged groundwater will be achieved at the POTW. The principal threats at the Site will be eliminated by use of these treatment technologies.

13.0 SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of any significant changes from the preferred alternative originally presented in the Proposed Plan (Appendix B). Below are the specific changes made in the ROD as well as the supporting rationale for making those changes. The Proposed Plan was disseminated to the public on June 8, 1992.

Table 2 of the Proposed Plan listed the contaminants of concern and their corresponding remediation goals to be obtained by the remedial action. The metal, beryllium, was included on this list as the concentration of this metal detected in the groundwater at the Site was 1.4 ug/l which was above the MCL of 1.0 ug/l. However, the MCL for beryllium was revised since the distribution of the Proposed Plan. The beryllium MCL revision, published in the Federal Register on July 17, 1992 (Fed. Reg. 31,776 1992), changed the MCL from 1 ug/l to 4 ug/l. Consequently, the level of beryllium detected at the Site, 1.4 ug/l, no longer exceeds the MCL; therefore, beryllium was deleted from the list of chemicals of concern.

Table 2 of the Proposed Plan designated 5.0 ug/l, the MCL, as the cleanup goal for the contaminant benzene instead of the State's groundwater water standard of 1.0 ug/l. The MCL was selected as it was believed that 5.0 ug/l was the lowest concentration that current, laboratory analytical methodologies could accurately and consistently detect. However, this is not the case. U.S. EPA Method 602 can accurately and reliably detect concentrations of benzene down in the 1 ug/l concentration range. Consequently, the more stringent State groundwater standard for benzene was incorporated into Tables 17 and 22 of this ROD.

The Proposed Plan reported the cost for Alternative GW3 to be \$1,152,100. This cost, obtained from the May 18, 1992 draft Feasibility Study Report for the New Hanover County Airport Burn Pit Superfund Site, was based on operating the groundwater extraction and treatment system for 48 weeks. This duration was calculated using an effective porosity of 5 percent for the affected shallow aquifer. However, the Agency determined 5 percent for the effective porosity was too low of a value for a silty, sand aquifer. The pumping duration has been recalculated using the more appropriate value of 20 percent for the effective porosity. The recalculation is as follows:

$$(9,694,080 \text{ gallons} \times 3 \text{ pore volumes}) / (5 \text{ gpm} \times 3 \text{ extraction wells} \times 525,600 \text{ min/year}) = 3.7 \text{ years.}$$

Based on the recalculation, including design and implementation, the duration of the groundwater extraction and treatment system increased from 48 weeks to 4.5 years. Consequently, the cost of Alternative GW3 and the other alternatives that involved pumping and treating increased. The cost for Alternative GW3 rose from \$1,152,100 in the Proposed Plan to \$1,932,800.00 in the ROD.

APPENDIX A

**CONCURRENCE LETTER FROM THE STATE OF NORTH CAROLINA
AND RESPONSE FROM THE AGENCY**

State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Solid Waste Management

James G. Martin, Governor
William W. Cobey, Jr., Secretary

William L. Meyer
Director

24 September 1992

Mr. Jon K. Bornholm
Remedial Project Manager
US Environmental Protection Agency
Region IV
345 Courtland Street, NE
Atlanta, GA 30365

RE: Concurrence on Record of Decision
New Hanover County Airport Burn Pit NPL Site
Wilmington, New Hanover County, NC

Dear Mr. Bornholm:

We have received and reviewed your responses to comments made on the Draft Record of Decision. The Division of Solid Waste Management concurs with the selected remedial alternative with the following exception. The remediation goal for benzene at the Site should be 1 ug/l. Benzene can be accurately detected at or below this level by US EPA Method 602. Any deviation from this remediation goal will require a waiver from the North Carolina Division of Environmental Management. Areas where state water quality standards are not achieved will require deed recordation. If there are any questions, please call me at (919) 733-4996.

Sincerely,

Michael A. Kelly
Deputy Director

cc: Curt Fehn, US EPA
Perry Nelson, NC DEM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET N.E.
ATLANTA, GEORGIA 30365

SEP 25 1992

4WD-NCRS

Mr. Michael A. Kelly
Deputy Director
North Carolina Department of Environment, Health, and Natural Resources
Division of Solid Waste Management
P.O. Box 27687
Raleigh, North Carolina 27611-7687

RE: State's Concurrence on the New Hanover County Airport Burn Pit Superfund Site Record of Decision

Dear Mr. Kelly:

EPA-Region IV appreciates the State's concurrence on the Record of Decision (ROD) for the New Hanover County Airport Burn Pit Superfund Site located in Wilmington, North Carolina. For the record, EPA would like to respond to your September 24, 1992 concurrence letter. Your letter, along with this response, will be included in Appendix A of the ROD. These letters should stand as official documentation that EPA-Region IV and North Carolina Department of Environment, Health, and Natural Resources have agreed on the preferred alternatives at this point in time.

For your information, the Agency has incorporated the States's groundwater standard of 1.0 ug/l for benzene as the performance standard in the ROD. And the Agency recognizes that the State may in the future put in place, pursuant to State law (General Statute 130A-310.8), a deed recordation/restriction to document the presence of residual contamination which may limit the future use of the property.

Please contact me at (404)3457-7791 if you have any questions or comments regarding this matter.

Sincerely yours,

Jon K. Bornholm
Remedial Project Manager

cc: Curt Fehn, EPA
John Walch, NCDEHNR

APPENDIX B

PROPOSED PLAN FACT SHEET